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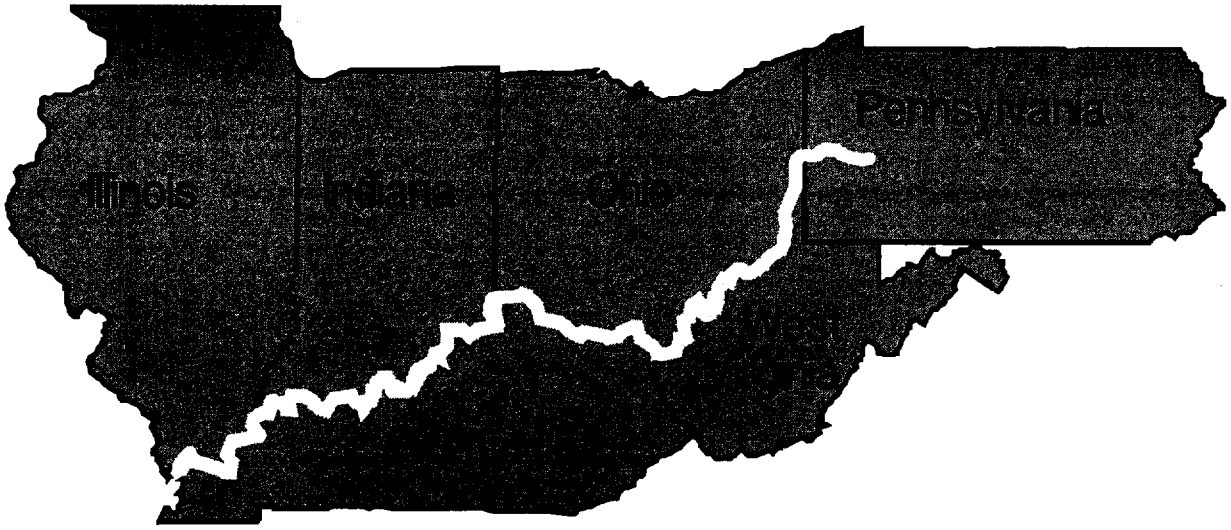
Always a River

Supplemental Environmental Education Curriculum on the Ohio River and Water Grades K - 12



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Supplemental Environmental Education Curriculum on the Ohio River and Water Grades K-12

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Preface

This curriculum was developed as a significant component of the project, *Always a River: The Ohio River and the American Experience,* a six-state collaboration devoted to exploring the historical and cultural development of the Ohio River. The *Always a River* project is being jointly sponsored by the Humanities Councils of Illinois, Indiana, Kentucky, Ohio, Pennsylvania, and West Virginia, and the National Endowment for the Humanities. Its primary purpose is to provide people living in the states through which the Ohio River flows with an opportunity to explore their local cultural and natural history. One feature of the *Always a River* project is a specially outfitted barge carrying an interactive exhibit that, during the summer of 1991, stopped at various locations along the entire length of the Ohio River, from Pittsburgh, Pennsylvania, to Cairo, Illinois. The exhibits from this "floating museum" became a permanent part of the Clarksville, Indiana, Interpretive Center upon completion of the barge's journey. Other features of the project include book readings and discussion programs in local libraries, a public history conference, a series of educational programs, and the preparation of this curriculum for students in grades kindergarten through twelve.

As its contribution to the *Always a River* project, the U.S. Environmental Protection Agency (EPA), Office of the Senior Official for Research and Development, Center for Environmental Learning, developed this curriculum through a collaborative effort, with the assistance of many individuals and organizations. The result, *Always a River: Supplemental Environmental Education Curriculum, Grades K-12,* focuses on the environmental aspects of water and the Ohio River. The curriculum was developed as an interdisciplinary document, offering a wide variety of activities that can be integrated into existing curricula in science, social studies, mathematics, English, art, music, and other subject areas. A series of workshops have been conducted to introduce instructors to the curriculum and to provide guidance on its use.

We at EPA believe that environmental education is critical to young people's understanding of the complex issues facing us in the world today. It is our hope that curricula such as this will provide a valuable supplement to existing educational programs.

How to Use This Guide

Always a River: Supplemental Environmental Education Curriculum on the Ohio River and Water, Grades K-12 is a series of interactive hands-on activities, supported by background information, designed to engage students of all grade levels in investigating the Ohio River and its importance to the states through which it flows. The curriculum encompasses four primary objectives:

1. To demonstrate that the Ohio River is part of a total ecosystem that includes its floodplain and watershed.
2. To introduce the biological, physical, and chemical aspects of water and their importance to living things.
3. To explore human use of the Ohio River and the environmental impacts of human activity on the river and its watershed.
4. To examine the Ohio River's influence on historical cultures and its implications for shaping modern life.

Students will investigate each of these program areas in depth, focusing on such topics as the natural history of the river and its flora and fauna; the water cycle; the effects of physical and chemical properties on water quality and the organisms inhabiting a water body; the many uses of water and the importance of water conservation; drinking water and wastewater treatment; and cultures and settlements along the Ohio River Valley from ancient times to the present.

The guide is organized to provide maximum flexibility and ease of use for teachers of all grade levels. Each objective listed above constitutes a unit, which is further broken down into two to four sections covering specific topics. The components of each unit are as follows:

1. **Unit opener page.** Each unit opens with a page that describes the major sections, introducing the topics to be covered and the types of activities that students will encounter.
2. **Section background information.** Each section opens with several pages of background reading that prepare the teacher for presenting the activities in that section.
3. **Resources.** Following the background information are two lists of resources—publications and audiovisual programs—that can be used as valuable classroom references for particular activities or to broaden teacher knowledge.

4. **Activities.** The activities are the heart of the curriculum. Each section includes three to eight activities that allow students to explore the topics covered in the section. Each activity contains the following elements:

   - **Objective.** What students will accomplish by completing the activity and what skills they will use.
   - **Setting.** Where the activity should be performed (usually either in the classroom or outdoors).
   - **Duration.** Approximately how long the activity will take.
   - **Subject.** What academic subjects the activity encompasses.
   - **Skills.** What cognitive or behavioral skills students will exercise by performing the activity.
   - **Grade Level.** The grade level range for which the activity is designed.
   - **Vocabulary.** Which new terms students will need to know to understand the concepts presented in the activity. Vocabulary words appear in boldface type where they are introduced in the section background information. They are also defined in a glossary at the back of the guide.
   - **Background Information.** Where to look in the section background information to review the concepts being presented.
   - **Materials.** Equipment and/or resources needed to perform the activity.
   - **Procedure.** How to perform the activity. The procedure is described in a series of numbered steps, often including suggested discussion questions or alternatives for tailoring the activity to specific needs.
   - **Extension/Evaluation.** Suggestions for additional related activities that expand upon or enrich the concepts learned or that test students' mastery of these concepts.

   In addition, many activities are accompanied by maps, diagrams, clip art, and other handouts, which immediately follow the activity to which they pertain.

The curriculum also contains several additional tools designed to enhance the use of the activities. **Tables 1** and **2** (on the following pages) provide cross references to activities by grade level and by academic subject area, respectively, so that teachers can easily select projects suited to their needs. At the back of the curriculum, **Appendix A**, "Keeping Classroom Aquaria—A Simple Guide for the Teacher," provides step-by-step instructions for setting up and maintaining an aquarium so that students can study aquatic life firsthand. **Appendix B**, "Field Ethics: Determining What, Where, and Whether or Not!" discusses the ethical decisions regarding whether or not to collect, and how to do so with minimal impact to the environment. **Appendix C**, "Guidelines for In-

terviewing People," presents helpful hints on conducting interviews to obtain information from experts or to gain historical context for specific projects.

The last item in the curriculum is a glossary of words that are presented in the activities as new vocabulary. As mentioned earlier, these words also appear in boldface type as they are introduced in the background information for each section.

Table 1

Activities by Grade Level

The grade levels suggested below for each activity are intended as general guidelines. Many of the activities may be easily adapted for higher or lower grade levels or for more or less advanced students.

ACTIVITY	GRADE												
	K	1	2	3	4	5	6	7	8	9	10	11	12
UNIT IA How Big Is the River—Really? (p. 12)					✓	✓	✓	✓	✓				
Make an Imaginary River System (p. 16)	✓	✓	✓	✓	✓	✓	✓						
How Rivers Are Formed (p. 18)				✓	✓	✓	✓	✓	✓				
Making a Glacier (p. 20)	✓	✓	✓	✓									
What Lived Here? (p. 22)						✓	✓	✓	✓	✓	✓	✓	✓
UNIT IB Water Wings (p. 32)	✓	✓	✓	✓	✓	✓	✓						
Designing a Habitat (p. 35)			✓	✓	✓	✓	✓						
Pieces of the Puzzle (p. 38)					✓	✓	✓	✓	✓				
Ohio River Wetlands (p. 40)								✓	✓	✓	✓	✓	✓
Wetlands Trivia (p. 43)							✓	✓	✓	✓	✓	✓	✓

Table 1 (cont'd)

ACTIVITY	GRADE												
	K	1	2	3	4	5	6	7	8	9	10	11	12
UNIT IC													
Water Plant Art (p. 53)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Life Stages (p. 56)				✓	✓	✓	✓						
Field Observations of Aquatic Organisms (p. 62)					✓	✓	✓	✓	✓	✓	✓	✓	✓
Wildlife Flash Cards (p. 66)				✓	✓	✓	✓	✓	✓				
Plaster Casts of Animal Tracks (p. 68)						✓	✓	✓	✓	✓	✓	✓	✓
Wetlands Safari (p. 71)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Endangered Species Poster (p. 74)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
UNIT IIA													
Water, Water Everywhere (p. 85)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
How Wet Is Our Planet? (p. 87)					✓	✓	✓	✓					
The Never-Ending Cycle of Water (p. 91)				✓	✓	✓	✓	✓	✓				

Table 1 (cont'd)

ACTIVITY	GRADE												
	K	1	2	3	4	5	6	7	8	9	10	11	12
UNIT IIB A Change in the Weather (p. 101)					✓	✓	✓	✓	✓				
In Hot Water (p. 104)							✓	✓	✓	✓	✓		
Pondering pH (p. 107)				✓	✓	✓	✓	✓	✓				
The Disappearing Act (p. 111)					✓	✓	✓	✓	✓	✓			
Go with the Flow (p. 114)							✓	✓	✓	✓	✓	✓	✓
Life at the Surface (p. 117)					✓	✓	✓	✓	✓	✓	✓		
Dirty Water (p. 119)					✓	✓	✓	✓	✓	✓	✓		
Stream Study (p. 121)							✓	✓	✓	✓	✓	✓	✓
UNIT IIIA Water Use Collage (p. 133)	✓	✓	✓										
Where Does Our Water Come From? (p. 135)				✓	✓	✓	✓						
Model Distribution System (p. 138)				✓	✓	✓	✓	✓	✓				
Water Audit (p. 140)								✓	✓	✓	✓	✓	✓

Table 1 (cont'd)

ACTIVITY	GRADE												
	K	1	2	3	4	5	6	7	8	9	10	11	12
UNIT IIIB Losing Soil (p. 156)		✓	✓	✓	✓	✓	✓						
Sinking In: Development and Flooding (p. 159)	✓	✓	✓	✓	✓								
Ohio River Navigation Locks and Dams (p. 161)					✓	✓	✓						
Who Pollutes the River? (p. 164)		✓	✓	✓	✓	✓	✓						
Ground-Water Model (p. 167)				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Power Valley and the Impacts of Acid Rain (p. 171)					✓	✓	✓	✓	✓	✓	✓	✓	✓
Problems with Litter (p. 174)					✓	✓	✓	✓	✓	✓	✓	✓	✓
UNIT IIIC Looking at Algae (p. 186)				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
How Clean Are Your Hands? (p. 189)										✓	✓	✓	✓
Function of Filters (p. 191)	✓	✓	✓	✓	✓	✓	✓						
How Water Is Cleaned (p. 193)								✓	✓	✓	✓	✓	✓

Table 1 (cont'd)

ACTIVITY	GRADE												
	K	1	2	3	4	5	6	7	8	9	10	11	12
UNIT IIID Planning for the Future (p. 205)	✓	✓	✓	✓	✓	✓	✓						
Careers on the River (p. 209)							✓	✓	✓	✓	✓	✓	✓
Whose Job Is It? (p. 211)			✓	✓	✓	✓	✓						
Who Wants to Pay? (p. 213)			✓	✓	✓	✓	✓						
To Develop or Not to Develop? (p. 215)							✓	✓	✓	✓			
Pollution Detectives (p. 217)								✓	✓	✓	✓	✓	✓
UNIT IVA Archeological Sites (p. 230)						✓	✓	✓	✓				
Artifacts from the Past (p. 238)				✓	✓								
Let's Prepare an Ancient Indian Feast (p. 242)	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Who Were the Mound Builders? (p. 244)										✓	✓	✓	✓

Table 1 (cont'd)

ACTIVITY	GRADE												
	K	1	2	3	4	5	6	7	8	9	10	11	12
UNIT IVB Ohio River Place Names (p. 253)				✓	✓	✓							
The Shape of Our Town (p. 256)					✓	✓	✓						
Examining Local Economies of Current Ohio River Communities (p. 258)							✓	✓	✓	✓	✓		
Tales of the River (p. 261)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Watered Down History (p. 263)								✓	✓	✓	✓		

Table 2

Activities by Subject Area

Activities are categorized by subject area according to subjects generally taught at the grade levels recommended for those activities. For example, science activities geared toward the elementary grade levels will be categorized as "Science," rather than as "Biology" or "Chemistry." However, a science activity which spans a wide range of grade levels might be categorized as both "Science" and "Biology."

ACTIVITY	SUBJECT														
	Art	Biology	Chemistry	Economics	English	Geography	Government	Health	History	Language Arts	Mathematics	Music	Physics	Science	Social Studies
UNIT IA															
How Big Is the River—Really? (p. 12)						✓								✓	✓
Make an Imaginary River System (p. 16)	✓									✓					✓
How Rivers Are Formed (p. 18)						✓								✓	
Making a Glacier (p. 20)														✓	✓
What Lived Here? (p. 22)									✓					✓	✓
UNIT IB															
Water Wings (p. 32)	✓									✓		✓			
Designing a Habitat (p. 35)	✓									✓				✓	
Pieces of the Puzzle (p. 38)	✓	✓			✓					✓				✓	
Ohio River Wetlands (p. 40)	✓	✓		✓	✓		✓								✓
Wetlands Trivia (p. 43)		✓			✓		✓							✓	

Table 2 (cont'd)

ACTIVITY	SUBJECT														
	Art	Biology	Chemistry	Economics	English	Geography	Government	Health	History	Language Arts	Mathematics	Music	Physics	Science	Social Studies
UNIT IC															
Water Plant Art (p. 53)	✓	✓												✓	
Life Stages (p. 56)														✓	
Field Observations of Aquatic Organisms (p. 62)	✓	✓			✓					✓				✓	
Wildlife Flash Cards (p. 66)		✓												✓	
Plaster Casts of Animal Tracks (p. 68)	✓	✓												✓	
Wetlands Safari (p. 71)											✓			✓	
Endangered Species Poster (p. 74)	✓									✓				✓	✓
UNIT IIA															
Water, Water Everywhere (p. 85)										✓				✓	✓
How Wet Is Our Planet? (p. 87)											✓			✓	
The Never-Ending Cycle of Water (p. 91)														✓	

Table 2 (cont'd)

ACTIVITY	SUBJECT														
	Art	Biology	Chemistry	Economics	English	Geography	Government	Health	History	Language Arts	Mathematics	Music	Physics	Science	Social Studies
UNIT IIB															
A Change in the Weather (p. 101)			✓								✓			✓	
In Hot Water (p. 104)			✓								✓			✓	
Pondering pH (p. 107)														✓	
The Disappearing Act (p. 111)			✓								✓			✓	
Go with the Flow (p. 114)											✓		✓	✓	
Life at the Surface (p. 117)	✓									✓	✓		✓	✓	
Dirty Water (p. 119)			✓								✓			✓	
Stream Study (p. 121)		✓	✓											✓	
UNIT IIIA															
Water Use Collage (p. 133)	✓													✓	✓
Where Does Our Water Come From? (p. 135)	✓													✓	✓
Model Distribution System (p. 138)	✓													✓	✓
Water Audit (p. 140)				✓							✓			✓	

Table 2 (cont'd)

ACTIVITY	SUBJECT														
	Art	Biology	Chemistry	Economics	English	Geography	Government	Health	History	Language Arts	Mathematics	Music	Physics	Science	Social Studies
UNIT IIIB Losing Soil (p. 156)														✓	
Sinking In: Development and Flooding (p. 159)														✓	✓
Ohio River Navigation Locks and Dams (p. 161)											✓				✓
Who Pollutes the River? (p. 164)										✓				✓	✓
Ground-Water Model (p. 167)														✓	
Power Valley and the Impacts of Acid Rain (p. 171)			✓											✓	✓
Problems with Litter (p. 174)														✓	✓
UNIT IIIC Looking at Algae (p. 186)	✓	✓						✓						✓	
How Clean Are Your Hands? (p. 189)		✓						✓							
Function of Filters (p. 191)														✓	
How Water Is Cleaned (p. 193)			✓					✓						✓	✓

Table 2 (cont'd)

ACTIVITY	SUBJECT														
	Art	Biology	Chemistry	Economics	English	Geography	Government	Health	History	Language Arts	Mathematics	Music	Physics	Science	Social Studies
UNIT IIID Planning for the Future (p. 205)	✓														✓
Careers on the River (p. 209)	✓				✓										✓
Whose Job Is It? (p. 211)														✓	✓
Who Wants to Pay? (p. 213)											✓			✓	✓
To Develop or Not to Develop? (p. 215)				✓	✓										✓
Pollution Detectives (p. 217)							✓							✓	✓
UNIT IVA Archeological Sites (p. 230)															✓
Artifacts from the Past (p. 238)															✓
Let's Prepare an Ancient Indian Feast (p. 242)								✓							✓
Who Were the Mound Builders? (p. 244)									✓						✓

Table 2 (cont'd)

ACTIVITY	SUBJECT														
	Art	Biology	Chemistry	Economics	English	Geography	Government	Health	History	Language Arts	Mathematics	Music	Physics	Science	Social Studies
UNIT IVB Ohio River Place Names (p. 253)										✓				✓	✓
The Shape of Our Town (p. 256)															✓
Examining Local Economies of Current Ohio River Communities (p. 258)				✓					✓						✓
Tales of the River (p. 261)					✓				✓			✓			✓
Watered Down History (p. 263)				✓		✓			✓						

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